

- L. galleotianus* Harms, Fedde Rep. Spec. Nov. 17: 322. 1921. Oaxaca, Mexico.  
*L. gillyi* Lundell, Wrightia 1: 56. 1945. Chiapas, Mexico.  
*L. hidalgensis* Lundell, Wrightia 1: 153. 1946. Hidalgo, Mexico.  
*L. hintoni* Sandwith, Kew Bull. Misc. Inf. 1936: 4. 1936. Mexico and Guerrero, Mexico.  
*L. malacotrichus* Harms, Fedde Rep. Spec. Nov. 17: 323. 1921. Mexico.  
*L. monofoliaris* Schery, Ann. Missouri Bot. Gard. 30: 89. 1943. Panama.  
*L. nicaraguensis* Lundell, Wrightia 1: 154. 1946. Nicaragua.  
*L. phlebophyllus* Standl. & Steyerl., Field Mus. Publ. Bot. 23 (2): 56. 1944. Guatemala.  
*L. stenodon* Harms, Fedde Rep. Spec. Nov. 17: 324. 1921. Oaxaca, Mexico.  
*L. whitei* Lundell, Wrightia 1: 154. 1946. Nicaragua.  
*L. yoroensis* Standl., Field Mus. Publ. Bot. 9 (4): 296. 1940. Honduras.

ZOOLOGY.—*On the crayfishes of the Limosus section of the genus Orconectes (Decapoda: Astacidae).*<sup>1</sup> HORTON H. HOBBS, JR., Miller School of Biology, University of Virginia. (Communicated by FENNER A. CHACE, JR.)

In the course of working over a series of crayfishes from the Nashville, Tenn., area collected for me by Dr. C. S. Shoup, of Vanderbilt University, and Dr. Mike Wright, of Tusculum College, it was necessary to examine the type specimens of several of the species of the *Limosus* section. In making this study I arrived at certain conclusions, which are discussed below, concerning the affinities of the members of this section which are not in accord with the opinions of others. In addition to the description of a new species I am including a key to the species of the *Limosus* section.

The new species herein described was first reported by Fleming (1939) under the name *Cambarus propinquus sanborni* Faxon. I have compared my specimens with Fleming's description and figures which leave much to be desired. In addition, I have examined several crayfish he sent to the United States National Museum<sup>2</sup> from the only locality he cited for his *C. propinquus sanborni*, and I am convinced that his specimens were members of the species I am describing below. The only locality that Fleming recorded is "Mill creek, located about 4 miles south of Nashville where this creek crosses the Murfreesboro Road [U. S. Hy. 41], studied on August 18, 1935" (Fleming, 1939, 13: 298).<sup>3</sup>

<sup>1</sup> Received July 17, 1947.

<sup>2</sup> These are not the specimens mentioned by Fleming in his report of the higher Crustacea in the Nashville region, for he stated that Mill Creek was "studied on August 18, 1935," and these were collected on August 15, 1936.

<sup>3</sup> This peculiar citation is necessary because

#### Genus *Orconectes* Cope 1872

##### *Orconectes shoupi*, n. sp.<sup>4</sup>

*Cambarus propinquus* Fleming, 1939, 14: 305 (in part).

*Cambarus propinquus sanborni* Fleming (not Faxon), 1939, 14: 305, 306 (in part), 319, 320, and pl. 14.

*Diagnosis*.—Rostrum with lateral spines, margins thickened and concave laterad; upper surface with or without a median carina. Fingers of chela with usual longitudinal ridges much reduced; whole hand resembling that of *O. rusticus placidus* (Hagen, 1870: 65). Epistome with a median carina (see Fig. 4). Areola approximately 9 to 10 times longer than broad, with two or three punctations in narrowest part—length 34–36 percent of entire length of carapace; in male, hooks on ischiopodites of third pereopods only. Terminal elements of first pleopod of first-form male short, reaching almost to coxopodite of second pereopod. Two terminal elements separated for only a short distance near tip: mesial process recurved caudomesiad and shorter than central projection. Annulus ventralis immovable. (See Fig. 5 for surface contour.)

*Holotypic male, form I*.—Body subovate,

Fleming's paper was divided, and appeared in two volumes of the Proceedings of the Tennessee Academy of Sciences; an overlapping in page references causes a further complication. See "Literature Cited."

<sup>4</sup> Dr. C. S. Shoup has made a definite and worthwhile contribution toward a knowledge of the fauna of the State of Tennessee. In token of the interest he has shown in my work on the crayfishes and the many specimens he has added to my collection, I name this new species in his honor.

distinctly depressed. Abdomen narrower than thorax. Width of carapace greater than depth in region of caudodorsal margin of cervical groove (15.2–9.4 mm).

Areola moderately narrow (9.6 times longer than broad), with two or three punctations in narrowest part; cephalic section of carapace about 1.8 times as long as areola (length of areola about 35.6 percent of entire length of carapace).

Rostrum with thickened margins concave laterad. Upper surface concave, but bearing a weak median carina. Base of acumen set off by corneous knoblike tubercles directed cephalodorsad. Acumen long and terminating cephalad in a corneous knob similarly disposed as the tubercles at its base. Subrostral ridges prominent and visible in dorsal aspect to base of acumen. Raised lateral margins of rostrum flanked laterally and mesially by rows of prominent setiferous punctations.

Postorbital ridges prominent, grooved dorsad and terminating cephalad in heavy acute tubercles. Suborbital angle absent. Branchiostegal spine obtuse, very much reduced. Small lateral spine present on each side of carapace. Surface of carapace granulate laterally and bearing prominent punctations dorsally; small polished area in gastric region.

Cephalic section of telson with two spines in each caudolateral corner.

Epistome bell-shaped in profile with a median longitudinal ridge; no cephalomedian projection.

Antennules of the usual form, with a small spine present on ventral surface of basal segment.

Antennae broken in holotype but extending caudad to cephalic margin of telson in other specimens. Antennal scale of moderate width with subparallel mesial and lateral margins; outer portion broad and swollen and terminating distad in a heavy spine; lamellar portion broad (see Fig. 9).

Chela somewhat depressed; palm inflated; prominent setiferous punctations present over most of chela. Inner margin of palm with three rows of squamous ciliated tubercles. Fingers widely gaping at base. Upper surface of immovable finger with a narrow well-defined ridge along mesial margin; lateral and lower margins with prominent punctations; upper opposable margin with a row of 18 rounded

corneous tubercles; an additional prominent tubercle present below this row at base of distal fifth of finger; minute denticles occurring in a single row on penultimate fifth of mesial surface of immovable finger; mesial distal fifth with a broader zone of similar denticles; lower proximomesial surface bearded. Opposable margin of dactyl with 23 rounded corneous tubercles; distal half of mesial margin bearing minute denticles interspersed between the rounded tubercles. Otherwise dactyl similar to immovable finger.

Carpus of first pereopod longer than broad, with a prominent longitudinal furrow on upper surface; all surfaces with scattered punctations. Mesial surface with a heavy spinous tubercle; distal upper mesial margin with a prominent rounded tubercle; lower distal margin with two heavy tubercles.

Merus, viewed laterally, with a single prominent tubercle on upper distal surface (a somewhat less prominent one lying mesiad of it but not evident in lateral aspect, nor is it present on sinistral merus). Lateral and mesial surfaces sparsely punctate. Lower surface with a lateral row of five small tubercles and a mesial row of eight (only the distal one in each row at all prominent).

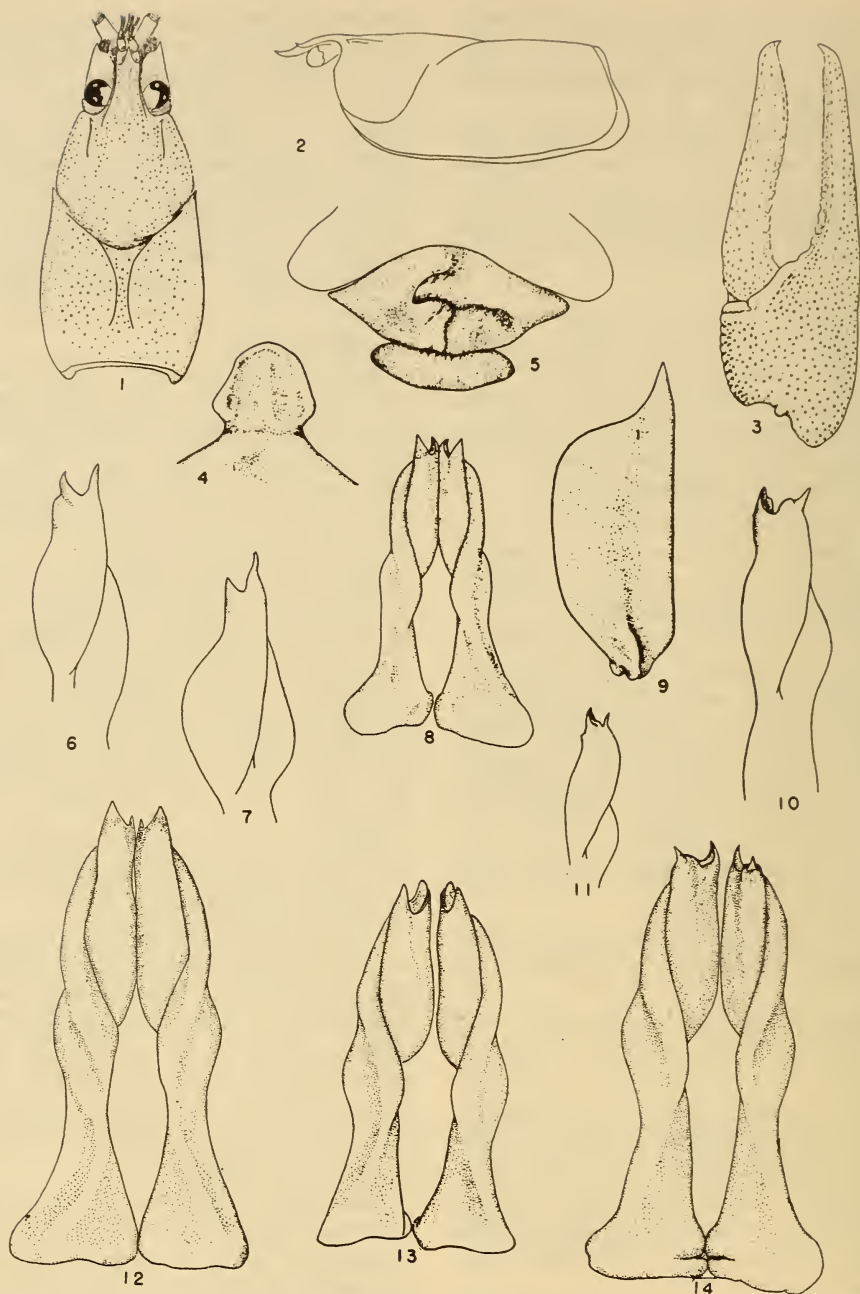
Hooks on ischiopodites of third pereopods only; hooks strong with proximal surfaces subplane and bearing setae.

First pleopod almost reaching coxopodite of second pereopod when abdomen is flexed. Tip terminating in two distinct parts, which are separated for only a short distance. Central projection corneous, almost straight, and somewhat bladelike, with tip slightly recurved. Mesial process extending distad for the proximal half of its length, then bending somewhat sharply caudomesiad.

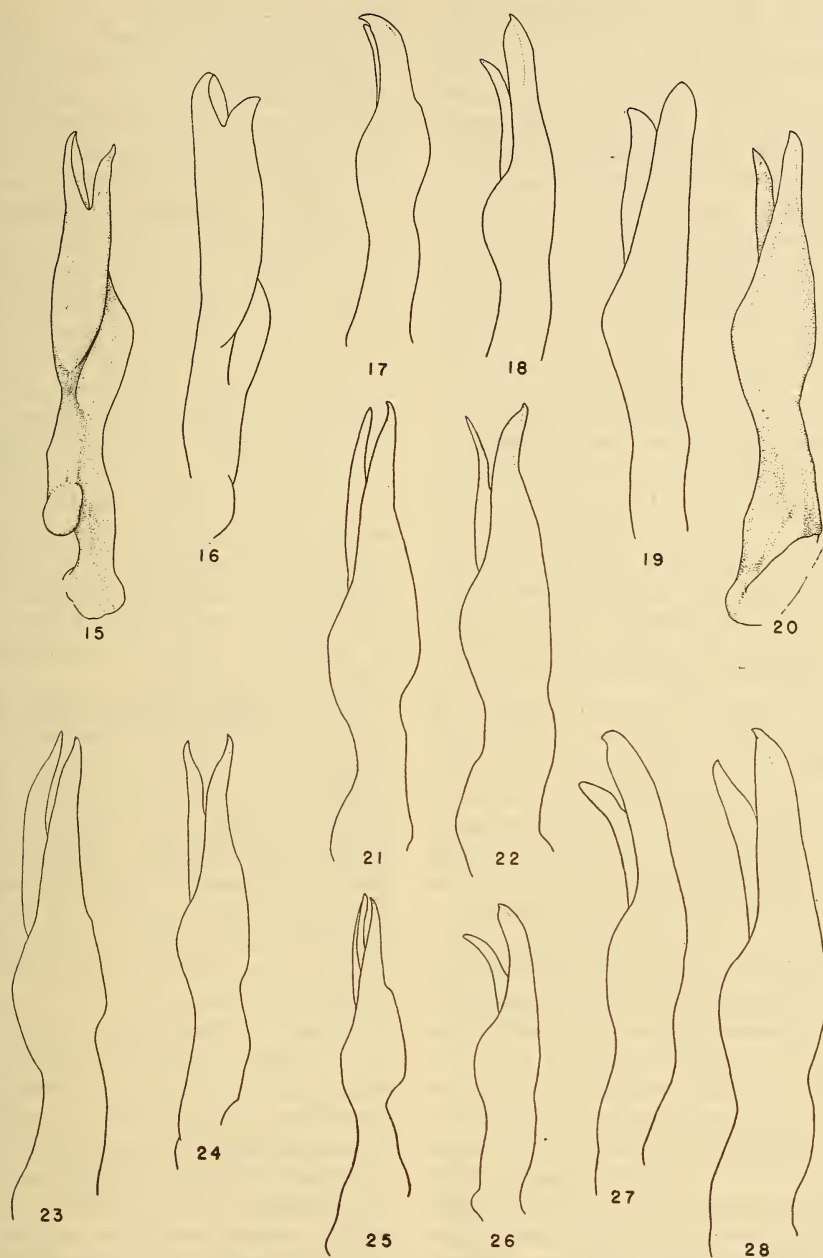
*Morphotypic male, form II.*—The only second-form male collected from the type locality is immature. Most of the tubercles mentioned in the description of the first-form male are present in this specimen as acute spines. The lower surface of the carpus and the cephalomesial surface of the merus of the cheliped with tufts of long plumose setae. Rostrum without median carina. Hook on ischiopodite of third pereopod very much reduced. See Figs. 16 and 19 for structure of first pleopod of a mature second-form male from Mill Creek.

*Allotypic female.*—Differs from the holo-





FIGS. 1-14.—1, Dorsal view of carapace of *Orconectes shoupi*, n. sp.; 2, lateral view of same; 3, upper surface of chela of first-form male, *O. shoupi*; 4, epistome of *O. shoupi*; 5, annulus ventralis of *O. shoupi*; 6, mesial view of first pleopod of first-form male of *O. pellucidus australis* (Rhoades), from McFarlen Cave, SW $\frac{1}{2}$  NW $\frac{1}{2}$  sec. 22, T. 3, R. 3 E., near Garth, Jackson County, Ala.; 7, mesial view of first pleopod of first-form male of *O. pellucidus pellucidus* (Tellkamp), from Mammoth Cave, Roaring River, Edmonson County, Ky.; 8, caudal view of first pleopods of first-form male, *O. pellucidus packardii* Rhoades (holotype), from Cumberland Crystal Cave at Alpine, Pulaski County, Ky.; 9, antennal scale of *O. shoupi*; 10, mesial view of first pleopod of first-form male, of *O. inermis* Cope, from Seibert's Well Cave near Wyandotte Cave, Crawford County, Ind.; 11, mesial view of first pleopod of first-form male of *O. pellucidus packardii* Rhoades (holotype) (see explanation of Fig. 8); 12, caudal view of first pleopods of first-form male of *O. pellucidus pellucidus* (Tellkamp) (see explanation of Fig. 7); 13, caudal view of first pleopods of first-form male of *O. pellucidus australis* (Rhoades) (see explanation of Fig. 6); 14, caudal view of first pleopods of first-form male of *O. inermis* Cope (see explanation of Fig. 10).



FIGS. 15-28 (all figures except 15, 16, and 19 lateral views of the first pleopods of first-form males).—15, Mesial view of first pleopod of first-form male of *Orconectes shoupi*, n. sp.; 16, same, second-form male; 17, *O. harrisoni* (Faxon), from stream at Irondale, Washington County, Mo.; 18, *O. sloani* (Bundy), from Little Creek, Jefferson Township, Preble County, Ohio; 19, lateral view of first pleopod of second-form male of *O. shoupi*; 20, *O. shoupi*; 21, *O. rafinesquei* Rhoades (holotype), from Rough River, at Falls-of-Rough, Grayson-Breckinridge Counties, Ky.; 22, *O. limosus* (Rafinesque), from Le-man Place, Lancaster County, Pa.; 23, *O. tricusps* Rhoades (holotype), from Pete Light's Spring, 3 miles east of Canton, Trigg County, Ky.; 24, *O. indianensis* (Hay), no locality given, U.S.N.M. no. 44448; 25, *O. propinquus propinquus* (Girard), from Rocky Creek, Muncie County, Ill.; 26, *O. difficilis* (Faxon), from stream 1 mile south of Wilburton, Latimer County, Okla.; 27, *O. kentuckiensis* Rhoades (holotype), from Piney Creek, 3 miles west of Shady Grove, Crittenden County, Ky.; 28, *O. sloani* (Bundy), Indiana (probably from near New Albany), U.S.N.M. no. 58058.

typic male in that the tubercles are for the most part more spiniform; epistome with a small cephalomedian spine; upper distal surface of merus of cheliped with two prominent tubercles evident in lateral aspect; extreme distal margin of merus emarginate; lower surface of merus and mesial surface of carpus with tufts of plumose setae. Annulus ventralis subspindle-shaped, with the greatest length in the transverse axis; cephalic margin evenly rounded and firmly fused with sternum; sinus originates near cephalomedian margin, extends caudad for a short distance, and turns gently caudodextrad, then abruptly sinistrad to cross the median line; here it turns caudad and slightly dextrad to the median line and then caudad to the midcaudal margin of the annulus (see Fig. 5).

*Measurements.*—HOLOTYPE MALE: Carapace, height 9.4, width 15.2, length 26.9 mm; areola, width 1.0, length 9.6 mm; rostrum, width 3.8, length 6.4 mm; abdomen, length 27.7 mm; right chela, length of inner margin of palm 7.5, width of palm 11.4, length of outer margin of hand 28.7, length of dactyl 19.3 mm. ALLOTYPE FEMALE: Carapace, height 8.0, width 11.6, length 22.6 mm; areola, width 0.70, length 7.8 mm; rostrum, width 3.2, length 5.9 mm; abdomen, length approx. 24 mm; right chela, length of inner margin of palm 5.2, width of palm 7.3, length of outer margin of hand 17.2, length of dactyl 11.3 mm.

*Type locality.*—Mill Creek, tributary of Cumberland River, east of Oglesby near Antioch Pike, 10 miles south of Nashville, Davidson County, Tenn. Dr. Shoup has kindly furnished the following information: This creek is a hard-water stream flowing over sand and rubble and in its upper reaches over limestone ledges. The banks are silty and muddy, and shade is provided by reeds and trees along its banks. Much of its course is through pasture and cultivated lands. In riffle areas the water has a slightly greenish cast on cloudy days. (M. O. alkalinity—154.0 p.p.m. on January 24, 1947.)

*Disposition of types.*—The holotypic male, the allotypic female, and the morphotypic male, form II, are deposited in the United States National Museum (no. 84072), and in addition five second-form males and one female, collected by R. S. Fleming (U.S.N.M. no. 77908) are designated as paratypes. Of the remaining paratypes, one male, form I, and one

female are deposited in the University of Michigan Museum of Zoology; one male, form I, and one female in the Museum of Comparative Zoology; and 11 males, form I, one male, form II, two females, five immature males, and one immature female are in my personal collection at the University of Virginia.

*Specimens examined.*—TENNESSEE, Davidson County: Seven Mile Creek, 5 miles southeast of Nashville, November 11, 1944, two males, form I, one male, form II, and two females—C. S. Shoup, collector; Mill Creek, 10 miles south of Nashville, November 11, 1944, eight males, form I, one male, form II, and three females—C. S. Shoup, collector; Mill Creek at junction with U. S. Highway 41, about 3 or 4 miles south of Nashville, October 11, 1939, two males, form I—W. K. Smith, collector; same locality, August 15, 1936, five males, form II, and one female—R. S. Fleming, collector; Mill Creek at Antioch Pike, July 19, 1945, two males, form I, one male, form II (shed test), and four immature males—Mike Wright, collector.

Fleming (1939, 14: 319) states: "All of these species (including *C. propinquus sanborni* Faxon) were present throughout the region studied . . ."; however, he cites only one locality in which this species was taken. I strongly doubt that his statement is correct, for Drs. Shoup and Wright have collected in a large number of localities in the Nashville region and have taken *O. shoupi* (=Fleming's *C. propinquus sanborni* Faxon) from only the localities cited above.

*Variation.*—The rostrum may or may not bear a median carina. The bearded condition of the cheliped which is pointed out in the description of the morphotypic male, form II, is best developed in young specimens and may be reduced or obsolete in older ones. As in most species the spiniform condition is accentuated in the younger specimens, and in the older ones very much reduced; further, in some of the females mirrored images of the annulus ventralis as described for the allotype occur.

*Relationships.*—*Orconectes shoupi* is a member of the *Limosus* section; it possesses short gonopods, the tips of which are separated for only a short distance. Its closest affinities are with *O. sloani* (Bundy) (1876:24), *O. tricuspis* Rhoades (1944:117), and *O. rafinesquei* Rhoades (1944:116). *O. shoupi* may readily be



distinguished from any other species of the *Limosus* section by the rostrum with thickened ridges and the long-fingered chelae—both of which resemble those of *O. rusticus placidus*. (see further remarks below.)

#### LIMOSUS SECTION

Ortmann (1931:64) defined the section of *Orconectes limosus* as follows: "Gonopods of male, short, rather thick up to near the tips, reaching to the coxopodites of the third peraeopod. Tips separated for a short distance only, each tapering to a point. Males with hooks on third, or on third and fourth peraeopods." In this section he included *O. harrisoni*, *O. sloani*, *O. indianensis*, *O. limosus*, *O. pellucidus pellucidus*, and *O. pellucidus testii*.

Since 1931 Rhoades has described several additional species and subspecies belonging to the *Limosus* section, and in his *Crayfishes of Kentucky* (1944:117) recognized two groups of the section, and listed under them the species indicated below:

*Limosus* group—"characterized by strongly diverging tips of the gonopods." Species: *O. limosus* (Rafinesque), *O. sloani* (Bundy), and *O. indianensis* (Hay).

*Rafinesquei* group—"the tips of the first pleopod are both recurved in the same direction." Species: *O. rafinesquei* Rhoades, *O. tricusps* Rhoades, *O. pellucidus pellucidus* (Tellkamp), *O. pellucidus testii* (Hay), *O. pellucidus australis* (Rhoades), *O. pellucidus packardii* Rhoades, *O. kentuckiensis* Rhoades, and *O. harrisoni* (Faxon)

It is questionable that the above subdivision of the section into the *Limosus* and *Rafinesquei* groups is based on true affinities: e.g., if the pleopod of *O. kentuckiensis* is compared with that of *O. sloani* and *O. tricusps*, certainly it is more like that of the former. This relationship is seen not only in the first pleopod but also in the annuli ventralis of the two. It also seems to me that *O. harrisoni* is more nearly related to *O. sloani* than it is to *O. tricusps* or *O. rafinesquei*. Except for the fact that the terminal elements of the first pleopods of the several subspecies of *O. pellucidus* are "recurved in the same direction" (and I might indicate that among the specimens I have examined of *pellucidus pellucidus* the terminal elements are straight), I can see no indication of closer affinities of these forms with the members of the *Rafinesquei* group than with those of the *Limosus* group—in fact, if any division

of the *Limosus* section is made then it would seem that *O. inermis* and the various subspecies of *O. pellucidus* would constitute a natural group that should receive a status equivalent to that of the other subdivisions.

The problem of the status of *O. inermis* remains unsolved. Though I have seen relatively few specimens of the several subspecies of *O. pellucidus* I have examined several belonging to all of them, and none are like *O. inermis*. Perhaps it will be shown to be a subspecies of *O. pellucidus*; however, until future work will indicate intergradation between the two, it seems advisable to retain its specific status.

As might be expected, with the discovery of additional species the *Limosus* section has become decidedly less clear cut, and certain species exhibit characters transitional between the more typical members of the *Limosus* section and members of other sections of the genus. Even in Ortmann's diagnosis of the *Limosus* section quoted above the best character is stated on a relative basis, and a worker not already familiar with an over-all picture of the genus would have difficulty in deciding whether a given specimen belonged to the *Limosus* or *Propinquus* sections (Ortmann, 1931: 64, 65). The difficulty at the time that Ortmann diagnosed the section was not so great as it has been since the somewhat "atypical" *O. tricusps*, *O. rafinesquei*, and *O. shoupi* have been added to the list of described species belonging to the section. In these species the terminal elements of the first pleopod are almost as slender and long as are those of some of the members of the *Propinquus* section (see Figs. 21, 23, 25). These obvious resemblances as well as the similarities of the annuli ventralis and other anatomical features between *O. propinquus propinquus* (Girard, 1852: 88) and *O. tricusps* make the distinction between the two sections seem somewhat unnatural—i.e., there seem to me to be about as many resemblances between *O. tricusps* and the subspecies of *O. propinquus* as between *O. tricusps* and *O. sloani*, *O. limosus*, and *O. indianensis*. Furthermore, considering the pleopods alone, *O. kentuckiensis* is transitional between *O. limosus* and *O. sloani* on one side and *O. difficilis* (Faxon, 1898: 656) on the other—the latter at present being relegated to the *Virilis* section (Ortmann, 1931: 90). Rhoades (1944: 123) states in reference to the

affinities of *O. kentuckiensis* that it "represents a more advanced stage in the series of the 'Group rafinesquei'. The tips are stouter and more differentiated and the annulus is more depressed as in *sloani* and other members of the 'Group limosus'. In this character it resembles closely *O. immunis immunis*. Furthermore, it is not difficult to see a possible affinity to the 'Section of *C. virilis*' [= *O. virilis*] even in the gonopods of the male."

Whether these similarities are results of convergence or whether they indicate actual close relationships can hardly be determined until a more exhaustive study of the group (which will necessarily mean extensive collecting) is made. On the basis of the evidence at hand I find it difficult to consider these resemblances arising independently in the three sections.

The taxonomists working with the crayfishes of the Cambarinae have for a long time found it convenient to recognize "sections," "groups," and "subgroups," and even though there are certain species that on the bases of the diagnostic characters appear to be intermediate between two sections or groups, at least a temporary retention of their usage seems desirable. Whereas the limits of variation in the three sections of the subgenus *Orconectes* are not decidedly marked, and almost impossible to define in words, recourse to determined specimens or figures should alleviate difficulty in determining to which section or group any specimen in question belongs. For this reason I am including a sketch of the pleopods of all the species and subspecies (except *O. pellucidus testii*, of which I do not have a first form male) belonging to the *Limosus* section, and in addition, for comparative purposes, the pleopods of *O. propinquus propinquus* and *O. difficilis*.

KEY TO THE SPECIES AND SUBSPECIES OF THE  
LIMOSUS SECTION OF ORCONECTES  
(BASED ON THE FIRST-FORM MALE)

1. Body pigmented, eyes well developed. . . . . 2  
Body not pigmented, eyes reduced. . . . . 9
2. Terminal elements of first pleopod subequal in length and distinctly divergent (central projection directed cephalodistad and mesial process caudodistad). . . . . 3  
Terminal elements of first pleopod subequal or not subequal in length, but central projection never bent cephalodistad—either straight, directed caudad, or caudodistad. . . 4
3. Lateral surface of carapace with only one spine. . . . . *O. indianensis* (Hay)  
Lateral surface of carapace with more than one spine. . . . . *O. limosus* (Rafinesque)
4. Central projection bent caudad at an angle greater than 45°. . . . . *O. harrisoni* (Faxon)  
Central projection directed distad or bent caudad at an angle less than 45°. . . . . 5
5. Terminal elements of first pleopod subequal in length or mesial process slightly longer than central projection. . . . .  
. . . . . *O. tricuspis* Rhoades  
Mesial process never extending quite so far distad as central projection. . . . . 6
6. Central projection recurved (caudodistad) throughout its length; no median carina on rostrum. . . . . *O. kentuckiensis* Rhoades  
Central projection not recurved caudodistad throughout its length; median carina on rostrum present or absent. . . . . 7
7. Margins of rostrum thickened and concave laterad. . . . . *O. shoupi* Hobbs  
Margins of rostrum not thickened, and subparallel or convergent up to base of lateral spines. . . . . 8
8. Terminal elements of first pleopod widely separated and thick (heavy); tip of mesial process caudomesial of central projection. . . . . *O. sloani* (Bundy)  
Terminal elements of first pleopod not widely separated, and slender and tapering; tip of mesial process caudolateral of central projection. . . . . *O. rafinesquei* Rhoades
9. Margins of rostrum uninterrupted; acumen not distinctly set off from rest of rostrum. . . . . *O. pellucidus testii* (Hay)  
Margins of rostrum interrupted; acumen distinctly set off from rest of rostrum. . . . . 10
10. Cephalic margin of pleopod without a shoulder at base of central projection; however, either straight or curved. . . . . 11  
Cephalic margin of pleopod with an angular or rounded shoulder. . . . . 12
11. Cephalic surface of first pleopod in region of central projection straight; mesial process directed distad and extending distad beyond central projection. . . . .  
. . . . . *O. pellucidus pellucidus* (Tollkampf)  
Cephalic surface of first pleopod in region of central projection curved; mesial process directed caudodistad and somewhat laterad, and not extending distad beyond central projection. . . . . *O. inermis* Cope
12. Shoulder on cephalic margin at base of central projection rounded; hooks present only on ischiopodites of third pereopods. . . . .  
. . . . . *O. pellucidus australis* (Rhoades)<sup>5</sup>

<sup>5</sup> The holotype of *O. pellucidus australis* has a small short acute spine (probably corresponding to the caudal process seen in many members of the genus *Procambarus*), which in lateral aspect lies between the central projection and the mesial process.



Shoulder on cephalic margin at base of central projection distinctly angular; hooks present on ischiopodites of third and fourth pereopods. *O. pellucidus packardii* Rhoades.

## LITERATURE CITED

- BUNDY, W. F. *List of Illinois Crustacea, with descriptions of new species.* Bull. Illinois Mus. Nat. Hist. 1: 3-25. 1876.
- FAXON, W. *Observations on the Astacidae in the United States National Museum and in the Museum of Comparative Zoology with descriptions of new species.* Proc. U. S. Nat. Mus. 20: 643-694, 9 pls. 1898.
- FLEMING, R. S. *The larger Crustacea of the Nashville region.* Journ. Tennessee Acad. Sci. 13(4): 296-324; 14(2): 261-264; 14(3): 299-324. 1938-39.
- GIRARD, C. *A revision of the North American Astaci, with observations on their habits and geographical distribution.* Proc. Acad. Nat. Sci. Philadelphia 6: 87-91. 1852.
- HAGEN, H. *Monograph of the North American Astacidae.* Illus. Cat. Mus. Comp. Zool. no. 3: 1-109, 11 pls. 1870.
- HAY, W. P. *The crayfishes of the State of Indiana.* 20th Ann. Rep. Indiana Geol. and Nat. Res. Surv.: 446-507, 15 figs. 1895.
- ORTMANN, A. E. *Crayfishes of the Southern Appalachians and the Cumberland Plateau.* Ann. Carnegie Mus. 20(2): 61-160. 1931.
- RAFINESQUE, C. S. *Synopsis of four new genera and ten new species of Crustacea found in the United States.* Amer. Monthly Mag. and Crit. Rev. 2. art. 7(9): 40-43. 1817.
- RHOADES, R. *The crayfishes of Kentucky, with notes on variation, distribution and descriptions of new species and subspecies.* Amer. Midl. Nat. 31 (1): 111-149, 10 figs. 10 maps. 1944.

ORNITHOLOGY—*The races of the black-throated sunbird, Aethopyga saturata (Hodgson).*<sup>1</sup> H. G. DEIGNAN, U. S. National Museum.

For more than 30 years the race of *Aethopyga saturata* common on the mountains of northwestern Siam has, without any direct comparison of specimens, been recorded as *sanguinipectus* (a name originally applied to the form of the Karen Hills). Topotypes of *sanguinipectus* and of its presumed synonym *waldeni* (described from Mount Muleyit in Tenasserim) are nowhere available in America, but reference to the first descriptions and especially to Shelley's *Monograph of the Nectariniidae*, pt. 6, 1878, pp. 37-38 and colored plate (where the description is taken from the types of *sanguinipectus* and the illustration from the types of *waldeni*), has shown that *sanguinipectus* has the entire throat (except only the center of the chin) metallic blue or violet and is thus quite different from the Siamese bird, as well as from the several populations of Indochina that have been masquerading under its name. This discovery has made necessary a revision of the species, with the result that the number of races has been increased from the five accepted by Delacour (*Zoologica* 29: 34. 1944) to nine, of which three are here described for the first time.

Material essential to the prosecution of this study has been courteously sent me by the Museum of Comparative Zoology (M.C.Z.), the American Museum of Natural History (A.M.N.H.), the Princeton Museum of Zoology (P.M.Z.), the Academy of Natural Sciences of Philadelphia (A.N.S.P.), and the Chicago Natural History Museum (C.N.H.M.).

1. *Aethopyga saturata saturata* (Hodgson)

[*Cinnyris*] *Saturata* Hodgson, India Rev. and Journ. Foreign Sci. and Arts 1 (7): 273. Oct. 1836 (Nepal).

*Nectarinia hodgsonis* [sic] Jardine, Naturalist's Library 36 [Nectariniidae]: 240, 269 [where spelled *hodgsoni*], pl. 28, 1843 (Nepal).

*Range.* Himalayas, from Garhwal to Bhutan.

*Remarks.* The reference to Hodgson's name is incorrectly cited by Stuart Baker (*Fauna of British India, birds*, ed. 2, 7: 285. 1930) as "Ind. Review, vol. ii, p. 273, 1837." Sherborn (*Index Animalium*, p. 5753) gives "India Rev. I. 1837, 273." According to the researches of the late C. W. Richmond, the first volume of the India Review appeared in 12 monthly installments from April 1836 to March 1837, and the proper citation is that given above.

2. *Aethopyga saturata assamensis*

(McClelland)

*Cinnyris assamensis* McClelland, Quart. Journ.

<sup>1</sup> Published by permission of the Secretary of the Smithsonian Institution. Received June 10, 1947.